## REMARKS

### 1. Amendments

Claim 1 has been amended in several respects, as follows:

a) The method has been further defined as one for manufacturing a recording medium for offset printing. This is supported at page 3 lines 5-8 of the specification, and further in Table 2.

b) The method has been further defined by an operating speed, which is supported generally at page 11 lines 29-31 and in the examples, which are in all cases operated at a line speed of 1000 m/minute or less.

c) The BET surface area characteristics have been amended to conform to the ranges that appear in Table 1 of the patent application.

d) The term "and/or" has been removed and replaced with equivalent language. No change in scope is intended by this last limitation.

Claim 2 has been amended to specify that the pigment is the synthetic silica described in claim 1, specifically.

A new claim 21 has been added, to specify that the pigment is a precipitated calcium carbonate-silica composite or a mixture thereof with a synthetic silica. This claim is supported by original claim 1.

Amendments to claims 2, 4, 6, 7, 12, 14, 16 and 17 are conforming amendments.

New claim 22 is based on original claim 18.

Claims 5, 13 and 15 are canceled. The case now contains 19 total claims and 2 independent claims, so no additional claims fee is required.

### 2. The invention as now claimed.

The invention of amended claim 1 is a method for making an inkjet recording medium for offset printing. In the method, a base material is coated with a coating color. The coating color is applied on a transfer roll coater at a speed of 300 to 1000 m/minute. The coating color contains a pigment and a binder, and has a Hercules viscosity of from 5 to 30 mPa•s. The binder is either or both of:

a) a synthetic silica that has:

i) an oil absorption of 90 to 200 ml/100g;

ii) a BET specific surface area of 80 to 104 $m^2/g$; and

iii) an average particle diameter of from 1 to 3 microns; or

b) a precipitated calcium carbonate-silica composite that has;

i) an oil absorption of 100 to 250 ml/100g;

ii) a BET specific surface area of 26 to 30 $m^2/g$; and

iii) an average particle diameter of from 1 to 10 microns.

The technical problem that faced the inventors in this case was the need to provide a coating color to paper using a transfer roll coater (which allows high line speeds and the ability to coat both sides of the paper at once), while producing a paper that works well in both offset printing and in inkjet printing. As described on pages 1-3 of the application, adaptations that fulfill one of these needs often cause problems in other areas. A technical solution fulfilling all of these requirements has not been found, prior to this invention.

The ability of a paper to perform well in both offset printing and inkjet printing is of great practical importance. Many businesses use pre-printed letterhead in day-to-day operations. The letterhead is printed using offset printing, whereas ink-jet printing is commonly used in the office environment. A paper used in this way must perform well in both types of printing operations, which are very different in terms of how the images are produced as well as the particular inks and dyes that are used.

Applicants have found that a solution to this problem lies in the simultaneous selection of several parameters of the coating color; namely, the viscosity of the coating color and the oil absorption, surface area and particle diameter of the pigment. Whereas the art describes some of these parameters broadly, it does not teach or suggest applicants' particular selection of the parameters in combination.

Before discussing the references particularly, the examiner's attention is directed to Tables 1 and 2 of the application. The key parameters of the coating compositions of Examples 1-6 and 11-12, and Comp. Ex. 1, 2, 4 and 6 (i.e., those in which the pigment is only a synthetic silica) are repeated below. Values in **BOLD** are those which are outside of the ranges in applicant's claims:

| Ex. No. | Oil Absorption | BET surface area | Ave. Particle Diameter | Hercules Viscosity | Brookfield Viscosity |
|---|---|---|---|---|---|
| 1 | 147 | 80 | 2.1 | 19.0 | 300 |
| 2 | 122 | 83 | 1.3 | 19.8 | 340 |
| 3 | 170 | 81 | 2.7 | 19.5 | 280 |
| 4 | 147 | 80 | 2.1 | 19.0 | 300 |
| 5 | 147 | 80 | 2.1 | 19.0 | 300 |
| 6 | 147 | 80 | 2.1 | 19.0 | 300 |
| 11 | 177 | 104 | 2.2 | 10.6 | 260 |
| 12 | 147 | 80 | 2.1 | 19.0 | 300 |
| Comp. 1 | **214** | 89 | **3.4** | 21.8 | 320 |
| Comp. 2 | **82** | 95 | **0.5** | 18.5 | 360 |
| Comp. 4 | 147 | 80 | 2.1 | **39.5** | 700 |
| Comp. 6 | 135 | 102 | **0.6** | 12.5 | 280 |

In Comparative Example 1, the particle size and oil absorption are too large. In Comparative Ex. 2 and 6, the particle size is too small. In Comparative Example 4, the viscosity is too high. Note that the same silica product is used in each of Examples 1, 4, 5, 6, 12 and Comparative Example 4. Comparative Ex. 6 also differs from the others in that a Blade metering size press was used instead of a gate roll to lay down the coating.

Table 2 of the patent application describes various test results.

Comparative Example 4 is of special interest because the same synthetic silica is used there as in several of the other examples. Comparative Example 4 shows the effect of viscosity—when the coating color viscosity is too high (Brookfield viscosity of only 700 mPa•s), it become impossible to coat the paper on the gate coater, even though the pigment is otherwise suitable.

Comparative Example 1 shows the effect of having a particle size that is too large and too high of an oil absorption. In that case, the coated paper performs poorly during offset printing. Comparative Examples 2 and 6 show that ink absorption suffers badly when the particle size and/or oil absorption are too low. Optical density also suffers when the particle size and/or oil absorption of the silica is outside of the claimed ranges.

Therefore, the applicants have identified a narrow set of parameters which, if all are met, lead to a paper that can be coated easily at high speeds on a transfer roll coater, and which has a combination of properties that allows it to be printed with good results in both offset printing and inkjet printing processes.

3. Claims 6, 12 and 14

No art rejection has been indicated with regard to claims 6, 12 and 14. The examiner is requested to confirm that these are substantively patentable. If necessary to obtain allowance of these claims, applicants stand prepared to revise these claims to stand in independent form.

4. The art rejections

Claims 1, 8, 9 and 10 are rejected over the combination of Sekiguchi (USP 6312794) and Hayasaka (USP 5972167).

Sekiguchi describes coating colors that contain a binder and synthetic silica pigment. In Sekiguchi, the technical problem under consideration was how to prevent yellowing due to the presence of BHT in the paper. Sekiguchi found that the pore size of a synthetic silica binder affected the yellowness and could be selected to solve that problem. The relevant characteristics of Sekiguchi's coating compare with those of claim 1 (in the case where the pigment is a synthetic silica) as follows.

| Property | Present Claim 1 | Sekiguchi broad teaching | Sekiguchi specific teachings |
|---|---|---|---|
| Oil absorption | 90-200 ml/100g | ≥ 30, preferably ≥ 100 ml/100g | None |
| BET surface area | 80-104 | ≥20, preferably 50 to 400 | 180-255 (Table 1) |
| Particle size | 1.0 to 3.0 microns | 0.1 to 30 microns | 3.5-5.1 microns (Table 1) |
| Viscosity | 5-30 mPa•s (Hercules) | None | None |

Thus, it is seen that, as far as oil absorption, BET surface area and particle size are concerned, Sekiguchi in each case describes only very broad ranges that encompass the corresponding ranges in the present claims. When Sekiguchi becomes specific, his selections are outside of the ranges of the present claims.

Therefore, Sekiguchi cannot be fairly said to describe the combination of properties recited in applicant's claims, as in each case, applicant's ranges involve a specific selection within a broad, general teaching in Sekiguchi. As to BET surface area, and particle size, Sekiguchi actually would teach away from making the applicants' particular selection. As

to oil absorption, Sekiguchi provides no basis to make any selection within his open-ended range. There is certainly no suggestion that oil absorption could ever be too high, as the applicants have found.

Sekiguchi provides no guidance as to viscosity at all. For this, the examiner relies on Hayasaka. Hayasaka describes coating colors having a Brookfield viscosity from 100 to 1500 mPa•s. Although the applicants have defined their invention in terms of a different viscosity measurement (Hercules viscosity), the applicants have provided data which allow a rough correlation between the two measurements to be made. Applicant's Hercules viscosity measurements correspond to a Brookfield viscosity of something less than about 700 mPa•s, although it must be noted that the correlation between the two measurements is not always linear, as indicated in Table 1 of the patent application.

Thus, Hayasaka describes a viscosity range that is much broader than that of the claims that are presented here.

To reach the present invention from the combination of Sekiguchi and Hayasaka, one must

(1) determine that some selection with the four parameters of oil absorption, surface area, particle size and viscosity, from among the broad ranges described in these references, must be <u>simultaneously</u> made;

(2) make a specific selection as to oil absorption values without any suggestion in either reference to do so;

(3) make a specific selection of BET surface area <u>that is contrary to the specific selection</u> that was actually made in the Sekiguchi reference;

(4) make a specific selection of particle size <u>that is contrary to the specific selection</u> that was actually made in the Sekiguchi reference;

(5) assume that Hayasaka's viscosity teachings are applicable to Sekiguchi's different coating color, and

(6) make a specific selection as to coating color viscosity without any suggest to do so within the broad range described by Hayasaka.

Applicants submit that to do so would not have been obvious to one of ordinary skill in the art.

As to the examiner's inherency argument, the applicant's point out that, to the extent that "inherency" is relevant at all to a rejection under 35 USC §103(a), Hayasaka in fact <u>disproves</u> that applicant's viscosity range is inherently disclosed by Sekiguchi. On its

face, Hayasaka describes coating colors that have viscosities significantly greater than applicants' range, and in doing so, establishes that coating color formulations do not inherently have a Hercules viscosity of from 0.5 to 30 mPa•s. On the basis of Hayasaka, apparently some coating colors may have such a viscosity, and some may not. Therefore, applicant's viscosity is not inherent in coating colors generally and Sekiguchi's coating colors specifically. Furthermore, Sekiguchi's compositions are different than Hayasaka's. For example, Sekiguchi uses a specific synthetic silica pigment that is not described in Hayasaka. Therefore, Hayasaka's viscosity teaching do not necessary apply to Sekiguchi's coating colors.

For the foregoing reasons, the rejection as to claims 1 and 8-10 should be removed.

Claims 2, 3 and 18-20 are rejected over Sekiguchi, Hayasaka and Wason (USP 4191742). Wason is relied on only to supply the "wet grinding" limitation of claim 2.

This rejection fails for the same reasons as already described. The addition of Wason does not make it obvious for one of ordinary skill in the art to simultaneous select a specific range of oil absorption, BET surface area, particle size and coating color viscosity as the applicants have done, nor does the addition of Wason suggest any reason for doing so.

Claim 7 stands rejected over the combination of Sekiguchi and Hayasaka as before, together with Freeman (USP 6402824).

The amendment to claims 2 and 7 removed reference to a precipitated calcium carbonate silica composite from claim 7. Therefore, Freemen is of no relevance at all to claim 7, which is patentable over the combination of Sekiguchi and Hayasaka for the same reason as discussed with respect to claim 1.

Before discussing the remaining rejections, the examiner' attention is drawn to new claim 21. New claim 21 requires that a precipitated calcium carbonate-silica composite be present in the pigment. Claims 4, 11, 12 16 and 17 depend from new claim 21.

Like claim 1, claim 21 specifies parameters of oil absorption, BET surface area, particle size and viscosity. The ranges in this case are in some cases different than in claim 1, due to the difference in pigment. In claim 21, these parameters are specified as follows:

Oil absorption: 100 to 250 ml/100g

BET surface area: 26-30 $m^2/g$
Particle size: 1-10 microns
Viscosity (Hercules): 5-30 mPa•s

Claims 4 and 11 stand rejected over the combination of Sekiguchi and Hayasaka as before, in combination with Yaguchi (JP 61-118287).

The primary references here, Sekiguchi and Hayasaka, do not describe calcium carbonate-silica composites as pigments in coating colors. Sekiguchi's teachings regarding oil absorption, BET surface area and particle size are of marginal relevance here, because those teachings apply specifically to a synthetic silica pigment. Table 1 of applicant's specification shows how the selection of a composite pigment rather than the synthetic silica can affect the properties that are required. The particle size and BET surface area for the composite pigment are much different than for the synthetic silica pigment. This underscores the point that Sekiguchi's teachings with regard to synthetic silica pigments are not applicable with respect to the composite pigments.

Therefore, neither Sekiguchi or Hayasaka, or any combination thereof, suggests the specific limitations of claim 21.

Yaguchi is cited as showing a silica-calcium composite. According to Yaguchi, such a composite, when used in a thermal recording material, should have an oil absorption of at least 150 ml/100g and a specific surface area of 100 $m^2/g$ or less. These are broad ranges which do not teach or suggest the specific, much narrower ranges in applicant's claim 21.

And, as before, there is nothing in any of the references, even when they are taken together, that would suggest any reason for one skilled in the art to select the four parameters that the applicants have identified, and to develop the particular ranges within those four parameters in the way the applicant has done, to develop a process for making a recording material that is useful for offset printing and inkjet printing. It is again noted that the Yaguchi reference relates to an entirely different product, a thermal recording material.

Finally, claims 16 and 17 are rejected over the combination of Sekiguchi, Hayasaka, Wason and Freeman.

These claims depend from claims 21 and 4, respectively. Sekiguchi and Hayasaka do not lead to the invention of claims 4 or 21, as already discussed. Wason simply shows

that wet precipitation methods were known in the art, but otherwise does not describe or suggest the specific combination of elements of claims 4 or 21. So adding Wason to Sekiguchi and Hayasaka does not render claims 4, 21, 16 or 17 obvious.

Freeman describes a precipitation process for making calcium carbonate compositions. The compositions are said to be useful in paper coatings. One step of Freeman's process involves grinding a slurry of precipitated calcium carbonate to a particle size of 0.25 to 5 microns.

Claims 4, 16, 17 and 21 require a precipitated calcium carbonate-silica composite, not simply a precipitated calcium carbonate. And, to the extent that Freeman describes a particle size that overlaps with (and extends below) the particle size in applicant's claims, Freeman fails to suggest the specific BET surface area, oil absorption or coating color viscosity of these claims. Furthermore, applicants' data shows that different characteristics are required in different pigments in order to achieve good results.

Therefore, even the addition of Freeman fails to lead one of ordinary skill to make the multiple, simultaneous selections that are required by applicants' claims 4, 16, 17 and 21. Those claims therefore define patentable subject matter.

Respectfully submitted,
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